



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/720,761	03/26/2001	Franz Laetmer	10191/1629	5642
26646	7590	12/01/2003	EXAMINER	
KENYON & KENYON ONE BROADWAY NEW YORK, NY 10004			CHEN, KIN CHAN	
			ART UNIT	PAPER NUMBER
			1765	

DATE MAILED: 12/01/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/720,761

Applicant(s)

LAERMER ET AL.

Examiner

Kin-Chan Chen

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 02 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 19-36 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 19-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s), \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. The final rejection (April 10, 2003) is withdrawn. The non-final rejection on the application follows.

#### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 19-22 and 24-27 are rejected under 35 U.S.C. 103(a) as obvious over Flamm et al (Journal of the Electrochemical Society, Dec. 1982, USA Bd 129, Nr.12, Page 2755-2760) as evidenced by Pu et al. (US 5,843,847).

Flamm teaches a method of anisotropic plasma etching a laterally defined structure in as silicon substrate using a process gas. Flamm teaches adding a fluorine-delivering etching gas to the process gas. The fluorine-delivering etching gas may include  $\text{NF}_3$ ,  $\text{ClF}_3$  or  $\text{BrF}_3$  (page 2756, col. 1, full paragraph 3). Flamm also teaches that plasma in a wide range of gas mixtures including  $\text{CF}_4$ ,  $\text{CF}_4 / \text{O}_2$  and  $\text{C}_2\text{F}_6 / \text{O}_2$  (instant claims 20, 21, 22, 26, and 27) can be used to supply fluorine atoms for selective isotropic silicon etching. The said gas mixtures can deposit polymer (so-called precipitating at least one passivating material in the instant claims), see page 2755, col.

1 and 2). Because it is known that gas comprising  $C_2F_6$  can supply fluorine atoms for selective isotropic silicon etching and deposit polymer and because it is disclosed by Flamm, hence, it would have been obvious to one with ordinary skill in the art to incorporate gas mixtures including  $CF_4 / O_2$  and  $C_2F_6 / O_2$  in the method of etching silicon using the fluorine-delivering etching gas including  $NF_3$ ,  $ClF_3$  or  $BrF_3$  (instant claims 19, 24, 25) and use them in any combinations thereof in order to provide their art recognized advantages and produce an expected result since they have been taught to be useful for the same purpose (etching silicon substrate), see case law cited below. Also see Pu et al. (US 5,843,847; col. 1, line 62 through col. 2, line 4) in the record as evidence for the "known" statement of depositing polymer as a passivating layer. Furthermore, Flamm teaches using  $C_2F_6$  in anisotropic etching of silicon as stated above, because same material is used in the same process as claimed, therefore it would inherently contain same property such as a passivating material.

" It is prima facie obvious to use two compositions (two methods) each of which is taught by the prior art to be useful for the same purpose. " In re Kerkhoven 205 USPQ 1069 (CCPA 1980). In re Susi 169 USPQ 423, 426 (CCPA 1971). See also Ex parte Quadranti 25 USPQ 2d 1071 (BPAI 1992).

4. Claims 23 and 28-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Flamm et al. as evidenced by Pu et al. as applied to claims 19-22 and 24-27 above, and further in view of Charlet et al. (US 5,047,115).

Flamm teaches a method of anisotropic plasma etching a laterally defined structure in a silicon substrate using a process gas. Flamm teaches adding a fluorine-delivering etching gas to the process gas. The fluorine-delivering etching gas may include  $\text{NF}_3$ ,  $\text{ClF}_3$  or  $\text{BrF}_3$  (page 2756, col. 1, full paragraph 3). Flamm also teaches that plasma in a wide range of gas mixtures including  $\text{CF}_4$ ,  $\text{CF}_4 / \text{O}_2$  and  $\text{C}_2\text{F}_6 / \text{O}_2$  can be used to supply fluorine atoms for selective isotropic silicon etching. The said gas mixtures can deposit polymer (so-called precipitating at least one passivating material in the instant claims 29, 31, 33, 34), see page 2755, col. 1 and 2. Because it is known that gas comprising  $\text{CF}_4$  or  $\text{C}_2\text{F}_6$  can supply fluorine atoms for selective isotropic silicon etching and deposit polymer and because it is disclosed by Flamm, hence, it would have been obvious to one with ordinary skill in the art to add gas mixtures including  $\text{CF}_4 / \text{O}_2$  and  $\text{C}_2\text{F}_6 / \text{O}_2$  (instant claims 30, 31, 32, 33, 35, 36) in the method of etching silicon using the fluorine-delivering etching gas including  $\text{NF}_3$ ,  $\text{ClF}_3$  or  $\text{BrF}_3$  (instant claims 25, 30, 34) in order to provide their art recognized advantages and produce an expected result. See Pu et al. (US 5,843,847; col. 1, line 62 through col. 2, line 4) in the record as evidence for the "known" statement of depositing polymer as a passivating layer. Furthermore, Flamm teaches using  $\text{C}_2\text{F}_6$  in anisotropic etching of silicon, because same material is used in the same process as claimed, therefore it would inherently contain same property such as a passivating material.

Unlike the claimed invention, Flamm does not disclose that He or Ne may be used in the process of etching silicon substrate. In the method of etching silicon substrate, Charlet teaches that helium or argon (instant claims 23, 28, 29, 34) may be

used in the process of etching silicon substrate so as to ensure the stability of the discharge and its extension to the substrate (col. 2, lines 65-68). Hence, it would have been obvious to one with ordinary skill in the art to incorporate helium or argon as taught by Charlet in the process of Flamm in order to ensure the stability of the discharge and its extension to the substrate.

5. Claims 19-21 are rejected under 35 U.S.C. 103(a) as obvious over Sony (EP 0 414 372 A2).

Sony teaches a method of anisotropic plasma etching a defined structure in a silicon substrate using a process gas. Sony teaches adding a fluorine-delivering etching gas to the process gas. The fluorine-delivering etching gas may include  $\text{ClF}_3$ . Sony also teaches that plasma in a wide range of gas mixtures including  $\text{SiF}_4$ ,  $\text{Cl}_2/\text{O}_2$ , and  $\text{Cl}_2/\text{N}_2$  (instant claims 20, 21, 22, 26, and 27) can be used to supply fluorine atoms for selective isotropic silicon etching. The said gas mixtures can deposit a protective layer (so-called precipitating at least one passivating material in the instant claims), (col. 1 (page 2), lines 41-48; Col. 4 (page 3), lines 15-17). Sony teaches using dry etching to form a desired configuration in the silicon substrate. Sony is not particular about the desired configuration. Hence, it would have been obvious to one with ordinary skill in the art to etch a laterally defined structure because it is one of the most popular structures in the semiconductor device fabrication.

6. Claims 23, 29-32, and 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sony as applied to claims 19-21 above, and further in view of Charlet et al. (US 5,047,115).

The discussion of modified Sony from above is repeated here.

Unlike the claimed invention, Sony does not disclose that He or Ne may be used in the process of etching silicon substrate. In the method of etching silicon substrate, Charlet teaches that helium or argon may be used in the process of etching silicon substrate so as to ensure the stability of the discharge and its extension to the substrate (col. 2, lines 65-68). Hence, it would have been obvious to one with ordinary skill in the art to incorporate helium or argon as taught by Charlet in the process of Sony in order to ensure the stability of the discharge and its extension to the substrate.

### **Conclusion**

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Pu et al. (US 5,843,847; col. 1, line 62 through col. 2, line 4) teaches that fluorocarbon gas containing  $C_2F_6$  forms polymeric by products that deposits as a passivating layer.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (703) 305-0222. If attempts to reach the examiner by telephone are unsuccessful, the examiner's


Application/Control Number: 09/720,761

Page 7

Art Unit: 1765

supervisor, Nadine Norton can be reached on (703) 305-2667. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-2934.

*November 24, 2003.*

  
Kin-Chan Chen  
Primary Examiner  
Art Unit 1765